CLAIMS

What is claimed is:

1. A system, comprising:

a set of transceivers to couple a set of optical channels; and

an integrated optical circuit coupled to receive the set of optical channels from the set of transceivers, the integrated optical circuit having:

a set of optical amplifiers formed in the integrated optical circuit; and

a set of arrayed waveguide gratings (AWG) formed in the integrated optical circuit and coupled to the set of optical amplifiers.

2. The system of claim 1, further comprising a set of optical fibers to couple the set of transceivers to the integrated optical circuit.

3. The system of claim 1, wherein the set of optical amplifiers comprises a set of waveguide elements to combine pump light and optical signal light.

4. The system of claim 3, wherein the set of optical amplifiers includes a set of gain portions coupled to the set of waveguide elements.

5. The system of claim 4, wherein the set of optical signals includes a multiple channel optical signal and the AWG is coupled to demultiplex the multiple channel optical signal into a set of single channel optical signals.

6. The system of claim 4, wherein the set of optical signals includes a set of single channel optical signals and the AWG is coupled to multiplex the set of single channel optical signals into a multiple channel optical signal.

7. An apparatus, comprising:

an integrated optical circuit having:

a set of optical amplifiers formed in the integrated optical circuit; and

an arrayed waveguide grating (AWG) formed in the integrated optical circuit and coupled to the set of optical amplifiers.

8. The apparatus of claim 7, wherein the AWG is coupled to a set of optical amplifiers inputs via a set of input waveguide elements.

9. The apparatus of claim 8, wherein the AWG is coupled to a set of optical amplifier outputs via a set of output waveguide elements.

10. The apparatus of claim 7, wherein the set of optical amplifiers includes a set of gain portions coupled to the set of waveguide elements.

11. An apparatus, comprising:

an integrated optical circuit having:

a first arrayed waveguide grating (AWG) and a second AWG formed in the integrated optical circuit; and

a set of optical amplifiers formed in the integrated optical circuit and coupled between the first and second AWGs.

12. The apparatus of claim 11, wherein the first and second AWGs are coupled to the set of optical amplifiers via a set of waveguide elements.

13. The apparatus of claim 12, wherein the set of optical amplifiers is coupled to combine pump light and optical signal light.

14. An apparatus, comprising:

an integrated optical circuit having:

an arrayed waveguide grating (AWG) formed in the integrated optical circuit having an output set of waveguide elements;

a set of optical amplifiers formed in the integrated optical circuit; and coupled to the output waveguide elements.

15. The apparatus of claim 14, wherein each optical amplifier in the set of optical amplifier has a predetermined length to compensate for non-uniform gain spectrum of the AWG.

16. The apparatus of claim 15, wherein the set of optical amplifiers is coupled to combine pump light and optical signal light.

17. The apparatus of claim 16, further comprising a pump interface to couple pump light to the set of optical amplifiers.

18. The apparatus of claim 16, further comprising an optical signal interface to couple optical signal light to the AWG.

19. An apparatus, comprising:

an integrated optical circuit having:

an arrayed waveguide grating (AWG) formed in the integrated optical circuit having an input set of waveguide elements;

a set of optical amplifiers formed in the integrated optical circuit; and coupled to the input waveguide elements.

20. The apparatus of claim 19, wherein the set of optical amplifiers is coupled to combine pump light and optical signal light.

21. The apparatus of claim 19, wherein the AWG includes a waveguide array, wherein a shape and width of each waveguide in the waveguide array is varied to produce a varied light distribution a an AWG output waveguide array.

22. A method, comprising:

forming at least one multiplexer/demultiplexer in a single integrated optical circuit; and

forming at least one optical amplifier in the single integrated optical circuit and coupling an output of the optical amplifier to the an input of the multiplexer/demultiplexer via a waveguide formed in the integrated optical circuit.

23. The method of claim 22, further comprising forming a second waveguide in the single integrated optical circuit to couple an optical amplifier signal input to a signal coupler on the single integrated optical circuit.

24. The method of claim 22, further comprising forming a second waveguide in the single integrated optical circuit to couple an optical amplifier pump input to a pump coupler on the single integrated optical circuit.

25. The method of claim 22, wherein forming a multiplexer/demultiplexer in a single integrated optical circuit comprises forming an arrayed waveguide grating (AWG) in the single integrated optical circuit.

26. The method of claim 22, wherein forming an optical amplifier in a single integrated optical circuit comprises doping rare-earth ions in a waveguide formed in the single integrated optical circuit.

27. The method of claim 26, wherein sputtering rare-earth ions in a waveguide formed in the single integrated optical circuit comprises sputtering erbium ions or praseodymium ions in a waveguide formed in the single integrated optical circuit.

28. A method, comprising:

forming at least one multiplexer/demultiplexer in a single integrated optical circuit; and

forming at least one optical amplifier in the single integrated optical circuit and coupling an input of the optical amplifier to the an output of the multiplexer/demultiplexer via a waveguide element formed in the integrated optical circuit.

29. The method of claim 28, wherein forming a multiplexer/demultiplexer in a single integrated optical circuit comprises forming an arrayed waveguide grating (AWG) in the single integrated optical circuit.

30. The method of claim 28, wherein forming at least one optical amplifier in a single integrated optical circuit comprises doping rare-earth ions in at least one waveguide element formed in the single integrated optical circuit.